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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/497,508	02/04/2000	Jin Jang	8733.20079	7572

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MCKENNA LONG & ALDRIDGE LLP  
1900 K STREET, NW  
WASHINGTON, DC 20006

EXAMINER
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LOUIE, WAI SING

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 10/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/497,508

Applicant(s)

JANG ET AL.

Examiner

Wai-Sing Louie

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 9-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyanaga et al. (US 5,932,893) in view of Fonash et al. (US 5,994,164).

With regard to claim 9, Miyanaga et al. disclose a semiconductor device having doped polycrystalline layer (col. 11, line 8 to col. 21, line 45) comprising:

- Containing metal atoms, nickel, having a density range of  $1 \times 10^{17}$  to  $1 \times 10^{20}$  atoms/cm<sup>3</sup> on average, where the metal is a catalyst for metal induced crystallization of amorphous silicon (col. 8, lines 41-60, col. 11, lines 44-46 and fig. 4);
- The polycrystalline silicon film 104 is formed on an insulating substrate 101 (col. 11, lines 51-63);
- An insulating (buffer) layer 102 between the substrate 101 and the crystalline (polycrystalline) silicon film 104 (fig. 1a);
- The polycrystalline silicon film comprises an uniform distribution of the crystallites is needle-like (col. 6, lines 1-3; col. 7, lines 31-35; and col. 18, line 62 to col. 19, line 10), where the needle-shaped silicon crystallites are formed by

migration (movement) of a silicide of the metal (col. 7, lines 31-35 and col. 11, lines 44-46)

- The polycrystalline silicon film is formed by crystallizing an amorphous silicon film containing the metal by a thermal treatment (annealing) by lamp heating (lamp produces an electric field) efficiently absorbed by silicon film (col. 11, line 64 to col. 12, line 3);
- Miyanaga et al. do not disclose electrical conductivity activation energy between 0.52 to 0.71 eV. However, Fonash et al. disclose forming a polycrystalline film with nickel as a catalyst element at low temperature annealing (Fonash col. 3, lines 38-49), where the conductivity activation energy is 0.52 eV @ 290°C (Fonash fig. 8b). Therefore, it would have been obvious in light of the teaching of Fonash et al. that the claimed activation energy is achieved when polycrystalline film has nickel as catalyst. Since the applicant has not established the criticality of the activation energy stated and since these values are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these values in the device. Where patentability is said to be based upon particular chosen dimension or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990);
- Miyanaga et al. modified by Fonash et al. do not disclose applying an electrical field with metal electrodes and the needle-shaped silicon crystallites are formed by movement of a silicide of the metal. However, “applying an electrical field

with metal electrodes” and “the needle-shaped silicon crystallites are formed by movement of a silicide of the metal” are process limitations, which does not carry any patentable weight. A “product by process” claim is direct to the product *per se*, no matter how actually made. See *In re Thorpe et al.*, 227 USPQ 964 (CAFC, 1985) and the related case law cited therein which makes it clear that it is the final product *per se* which must be determined in a “product by process” claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in “product by process” claims or not. As stated in Thorpe,

even though product by process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Brown*, 459 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969); *Buono v. Yankee Maid Dress Corp.*, 77 F.2d 274, 279, 26 USPQ 57, 61 (2d. Cir. 1935).

**Note that applicant has burden of proof in such cases** as the above case law makes clear.

With regard to claim 10, Miyanaaga et al. disclose the metal is nickel (col. 11, lines 44-50).

With regard to claim 11, Miyanaaga et al. disclose the metal works as a catalyst during crystallization (col. 11, line 11).

*Response to Arguments*

Applicant's arguments filed 2/6/06 have been fully considered but they are not persuasive:

- Applicant argues claim 9 is allowable over the prior art Miyanaga et al., Fonash et al., and Ohtani et al. Applicant argues that none of the cited references, singly or in combination, teaches or suggests the “polysilicon film is formed by crystallizing an amorphous silicon film containing the metal by a thermal treatment and applying an electric field with metal electrodes, and where the needle-shaped silicon crystallites are formed by movement of a silicide of the metal”. However, Miyanaga et al. disclose the term crystalline silicon includes polycrystalline silicon, microcrystalline silicon, amorphous silicon containing crystal components, and semi-amorphous silicon having an intermediate state (col. 1, lines 33-41). Miyanaga et al. disclose amorphous silicon is heated for crystallization with metal impurities include nickel and cobalt (col. 3, lines 20-49). The crystallites is needle-like (col. 6, lines 1-3; col. 7, lines 31-35; and col. 18, line 62 to col. 19, line 10) and the needle-shaped silicon crystallites are formed by migration (movement) of a silicide of the metal (col. 7, lines 31-35 and col. 11, lines 44-46). Applying an electrical field with metal electrodes is an process limitation. Therefore, Miyanaga et al. and Fonash et al. meet the claimed invention in claim 9.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (571) 272-1709. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



WAI-SING LOUIE  
PRIMARY PATENT EXAMINER

Wsl  
October 19, 2006.